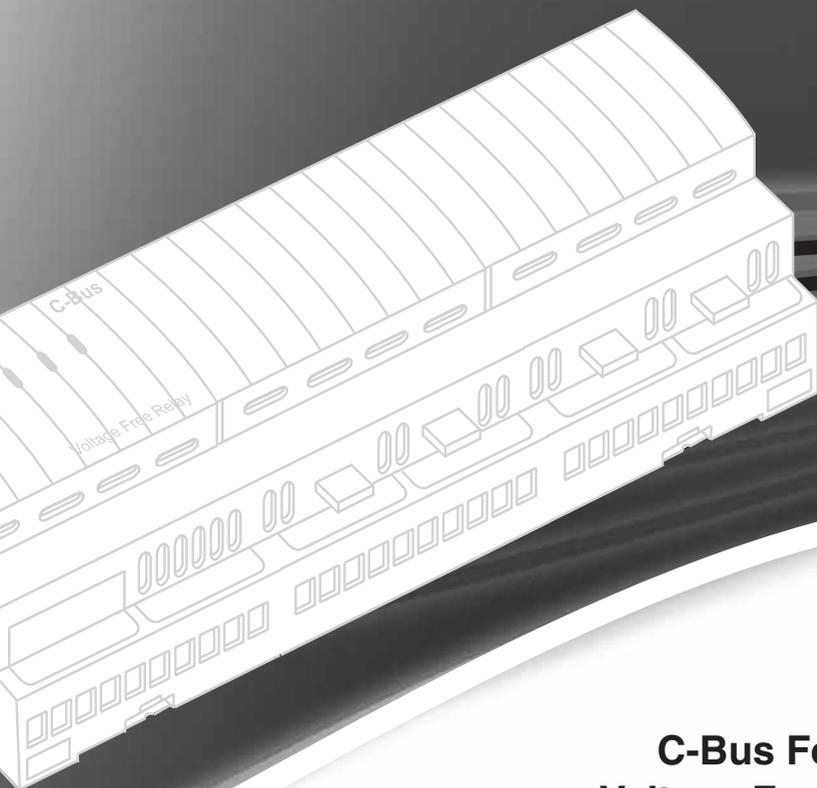


**CLIPSAL**<sup>®</sup>

by **Schneider Electric**



**C-Bus**<sup>®</sup>

**C-Bus Four Channel  
Voltage Free Relay, 20A**

**L5504RVF20**

Series



**Installation Instructions**

REGISTERED DESIGN • REGISTERED PATENT

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## 1.0 Product Range

<b>L5504RVF20</b>	Four Channel VF Relay, 20A with C-Bus Power Supply (220-240V, 50-60Hz)
<b>L5504RVF20P</b>	Four Channel VF Relay, 20A (220-240V, 50-60Hz)
<b>LE5504TRVF20</b>	Four Channel VF Relay, 20A with C-Bus Power Supply (110-120V, 50-60Hz)
<b>LE5504TRV20P</b>	Four Channel VF Relay, 20A (110-120V, 50-60Hz)

### 1.1 Description

devices, designed to be used in a switchboard application. For ease of installation they are DIN rail mounted, measuring 12M wide (1M = 17.5 +0.5/-0.0 mm). C-Bus connection is conveniently achieved through the use of RJ45 connectors, allowing similar units to be quickly looped together. Four independent voltage free relay contacts are provided for general switching applications.

### 1.2 Capabilities

The L5504RVF20 Series products have an internal C-Bus power supply capable of supporting a number of other C-Bus units (200mA capacity). All units with a suffix “P” do not have a C-Bus power supply, but consume no current from the C-Bus network during normal operation.

These units also generate a C-Bus system clock signal, therefore providing all the support necessary for a simple C-Bus network. Local toggle buttons are provided on each unit to allow individual channels to be toggled at each unit or via C-Bus commands. Remote ON and OFF facilities are available, permitting all channels to be turned ON or OFF without C-Bus network communications.

These units isolate mains power from the extra low voltage C-Bus network.

### 1.3 Compatible Loads

The L5504RVF20 Series C-Bus Four Channel Voltage Free Relay unit is suitable for use with resistive (incandescent), inductive and fluorescent loads.

Load Symbol	Compatible Loads	Maximum Total Load Rating
	Incandescent lighting, halogen 240V lamps	20A
	Fluorescent lighting	20A
	Resistive load	20A
	Low voltage lighting with iron-core transformers	20A
	Low voltage lighting with electronic transformers	20A
	Exhaust fans (shaded pole induction motors)* Ceiling fans (split-phase induction motors)*	20A

\*The installer must ensure an appropriate isolating circuit breaker is installed with the motor in order to comply with local wiring rules applicable to the region.

## 2.0 Wiring Instructions

A maximum of 10 C-Bus DIN rail units (with 200mA power supply) can be connected to a single C-Bus network. A maximum of 100 “P” suffix units may be interconnected.

A maximum torque of 1.4Nm should be applied to the mains rated screw terminals.

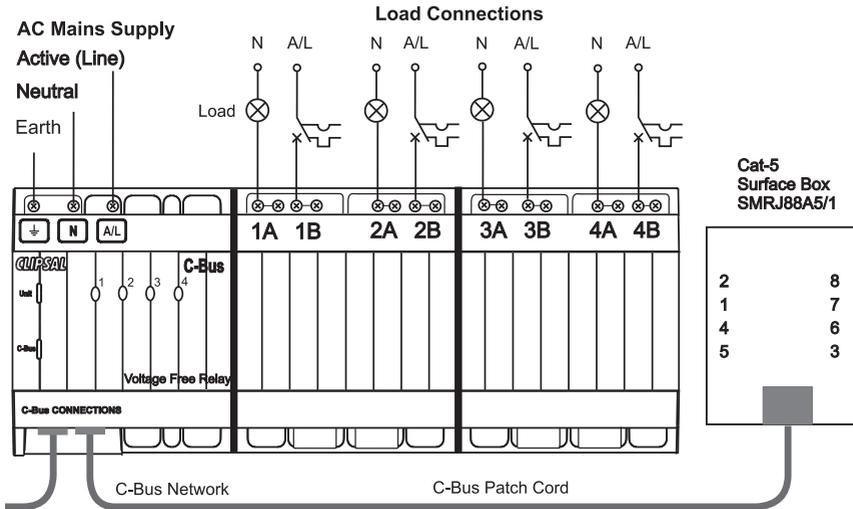


Figure 1. Wiring diagram using individual circuit breakers for the loads

An alternate method of connecting loads is shown in Figure 2. Choose a circuit breaker that can handle all of the attached loads. Make certain that the wiring method chosen meets local wiring regulations.

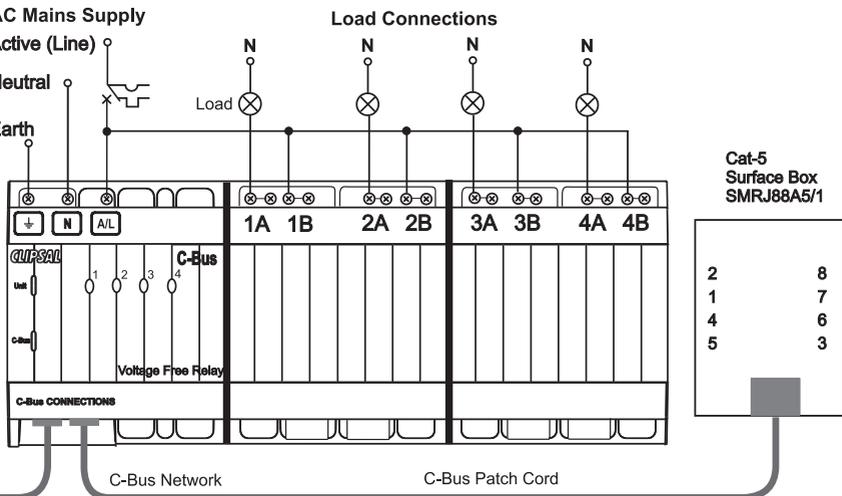


Figure 2. Alternate method of wiring the loads

## Notes:

- The unit is capable of handling up to four channels of 20A switched Active loads. The installer should make adequate consideration for the total current consumption when selecting power feed cables. It is recommended the installer allows for multiple feed cables.
- A maximum of 10 C-Bus DIN rail units (with 200mA power supply) can be connected to a single C-Bus network. A maximum of 100 “P” suffix units may be interconnected.
- The installer must fix mains cables in the distribution board using cable ties or trunking as required by local wiring rules. Care must be taken not to allow copper strands to enter the DIN unit’s apertures.
- A maximum torque of 1.4Nm should be applied to the mains rated screw terminals.
- Rubber bungs are supplied (3 of) for unused RJ45 connectors, to stop foreign bodies from entering the unit. Always ensure these bungs are installed when the relay unit is to be mounted inside a mains rated enclosure.

## 3.0 Connection to the C-Bus Network

Installation requires connection to the unshielded twisted pair (UTP) C-Bus network cable. The illustration opposite, shows the recommended cable termination technique for providing the best electrical performance. It is required that Category 5 data cable is used, (Clipsal catalogue number 5005C305B [solid], or 5005C305BST [stranded]).

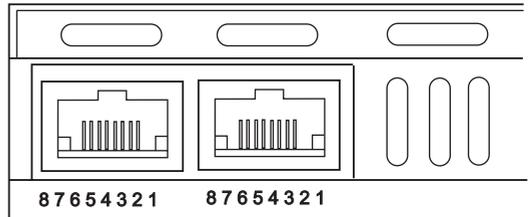


Figure 3. RJ45 pin layout

RJ Pin	C-Bus Connection	Colour
1	Remote ON	Green/White
2	Remote ON	Green
3	C-Bus Neg (-)	Orange/White
4	C-Bus Pos (+)	Blue
5	C-Bus Neg (-)	Blue/White
6	C-Bus Pos (+)	Orange
7	Remote OFF	Brown/White
8	Remote OFF	Brown

Table 2. C-Bus network signals on an RJ45 plug

## Note:

A Clipsal RJ5CB300PL Cat. 5e UTP patch cord is included with the unit for easy interconnection. No more than ten L5504RVF20 Series products should be connected to one physical C-Bus network. This may be extended to 100 for "P" suffix units.

Rubber plugs are supplied for unused RJ45 connectors, to stop foreign bodies from entering the unit. Always ensure these bungs are installed when the relay unit is to be mounted inside a mains rated enclosure.

## Remote Override Facility (optional)

The control of all channels on a unit can be achieved via the extra pairs of conductors on the C-Bus connector. The diagram below shows switches may be connected in parallel on any one network, using Green and Green/White conductors for the remote ON function. Brown Brown/White may be wired in the same fashion for remote OFF, with these conductors being connected to C-Bus negative via the switch to action this state. A Clipsal 30/1/2LM mechanism makes an ideal remote input switch.

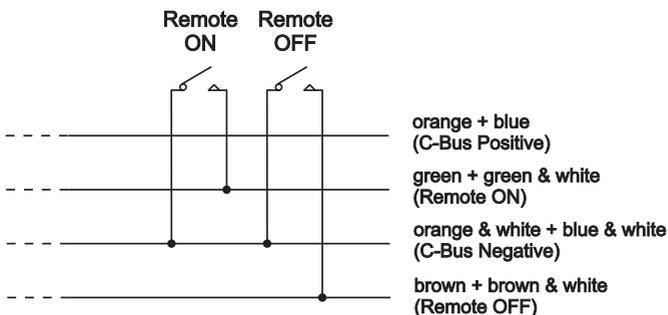


Figure 4. Remote on and remote off wiring diagram

## 4.0 Indicators and Controls

### 4.1 C-Bus Status Indicator

The C-Bus indicator shows the status of the C-Bus network at this unit. If sufficient network voltage and a valid C-Bus clock signal are present then the 'OK' signal (continuous green light) is displayed. If a network is connected which has more current load than the power supplies can support, then this indicator flashes to show a marginal network voltage. If there is no C-Bus clock present, then this indicator does not light. When the unit is powered from C-Bus only, for stand-alone programming, this indicator does not function.

Indication	Meaning
On	Power on and functional
Flashing	Insufficient power to support network, 15 – 20V d.c. on C-Bus
Off	No C-Bus clock signal present, no mains connected or C-Bus voltage below 15V d.c.

Table 3. C-Bus status indicator functions

### 4.2 Unit Status Indicator

This indicator shows the status of the individual unit. When mains is supplied to the unit, 'OK' will be displayed (continuous green light). If any of the four channels have been toggled (using override facilities) into a state other than is present on the C-Bus network, this indicator will flash with a 90% ON duty cycle. This applies to either local or remote override inputs. When the unit is powered from C-Bus only for stand-alone programming, this indicator will not function.

Indication	Meaning
On	Normal operation
Flashing	Unit in override mode
Off	No mains connected

Table 4. Unit status indicator functions

### 4.3 Local Override Push Buttons

The buttons located on the front of the unit provide a means to toggle each channel locally (at the unit). Each button is illuminated when the respective channel is in the ON state.

Operation	Function
Short Press	One short press will toggle the state of this channel only
Double Click	Two short presses within 2 seconds will return this channel only to the C-Bus network level
Long Press	Pressing any of the local override buttons for longer than 2 seconds will return all channels to the C-Bus network level

Table 5. Local override push button functions

#### Note:

Double-click and long press operations will only occur if the unit/channel is already in override mode (not in learn mode).

C-Bus commands received by the unit will (by default) override local toggle changes. In this case, only the channel associated with the received commands will revert to the current C-Bus network state. This option may be disabled in software. Please refer to section 7.5, Priority of Operating Modes.

### 4.4 Mechanical Switches

Each channel has a sliding mechanical switch that can be used to turn the relay on or off. You can use the slider to change the current state of the relay, but the next C-Bus command, local override action or remote override action takes control of the relay state. The mechanical switch is provided for testing and commissioning purposes only.

## 4.5 Priority of Operating Modes

The output status of the L5504RVF20 Series C-Bus Four Channel Voltage Free Relay product can be changed by:

- pressing a C-Bus key,
- activating any of the local override buttons
- using the optional remote override facilities
- sliding the mechanical switch.

The following table shows the priority ranking of these control inputs.

Mode	Priority	Function
Remote OFF	1 (highest)	Turns all channels OFF
Remote ON	2	Turns all channels ON
Local Override	3	Toggle channel (see Note 1)
Mechanical Switch	See Note 2	Allows testing of relay channels. Set or reset by the next C-Bus command or override switches.
C-Bus Input Unit (Key, PIR etc)	4 (lowest)	Control the channel (see Note 1)

Table 6. Priority of operating modes

### Note 1

Local override has priority over normal C-Bus commands received on the bus (such as those generated by pressing a C-Bus key). By default, if any channel is in local override mode and a C-Bus command is received for that channel, the C-Bus command state will be imposed ("Enable C-Bus Priority" option). This feature can be disabled in software so all relevant C-Bus commands will be ignored by the unit when it is in local override mode.

### Note 2

Moving the mechanical switch slider changes the relay state until the next C-Bus command, local override or remote override action sets or resets the relay.

## 5.0 C-Bus Programming Requirements

The use of any non-approved software in conjunction with the hardware installation, without the written consent of Clipsal Australia may void any warranties applicable to the hardware.

The C-Bus Four Channel Voltage Free Relay must be programmed to set a unique identification (Unit Address) and mode of operation on the C-Bus network using C-Bus Toolkit software.

C-Bus Toolkit software can be downloaded from the Clipsal Website ([www.clipsal.com/cis](http://www.clipsal.com/cis)).

The relay products can also be programmed using Learn Mode. For further information about Learn Mode, please consult the C-Bus Learn Mode Operations and Programming Guide.

### 5.1 Stand-alone Programming

The C-Bus Four Channel Voltage Free Relay products can be programmed without a mains connection. The unit can be connected to any operational C-Bus network that is capable of supporting one or more extra C-Bus units (18mA current required). The unit can then be configured using the C-Bus Toolkit. Indicators and relays will only function when a mains connection is made.

### 5.2 C-Bus System Clock

The C-Bus Four Channel Voltage Free Relay product incorporates a software selectable C-Bus system clock. The system clock is used to synchronise data communication waveforms on a C-Bus network. At least one active C-Bus system clock is required on each C-Bus network for successful communications. No more than three units on any C-Bus Network should have clock circuitry enabled, so this option should normally be disabled using the C-Bus installation software.

If a system clock is required, it can be enabled from the 'Global Tab' on the Graphical User Interface (GUI) for the unit.

### 5.3 C-Bus Network Burden

The C-Bus Four Channel Voltage Free Relay product incorporates a software selectable network burden. The network burden can be enabled using C-Bus Toolkit Software. Toolkit software is designed to prevent the Burden from accidental selection.

A Network Burden may or may not be required to ensure correct operation of the C-Bus network. If in doubt, consult the C-Bus calculator (network design verification software utility) before proceeding with the hardware installation.

### 5.4 Power-up Load Status

All C-Bus units have onboard non-volatile memory, which is used to store the operating state of the unit in case of power loss. This series of products incorporate latching relays and will retain their current output status if C-Bus power is lost. On restoration of power the DIN rail relay unit initiates a short power-up diagnostic routine, which lasts for approximately 5 seconds. User programmable options will then allow the relay status to be set as desired.

## 5.5 C-Bus Power Requirements

The C-Bus Four Channel Voltage Free Relay is available in several different configurations. All variants draw 18mA from the C-Bus network when not connected to the mains supply. With mains connected, these units draw no current from the C-Bus network.

In addition, a unit whereby the catalog number does not include a “P” suffix (such as the L5504RVF20) can supply up to 200mA to the network when it is connected to the mains. “P” suffix variants (such as the L5504RVF20P) do not include the 200mA power supply.

Adequate C-Bus power supply units must be installed to support the connected devices. If in doubt, consult the C-Bus calculator (network design verification software utility) before proceeding with the hardware installation.

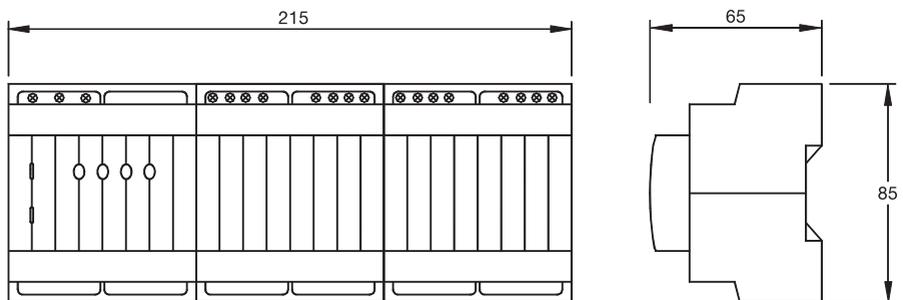
## 5.6 Power Surges

The mains voltage must be limited to the range specified for any unit that is mains powered. Each unit incorporates transient protection circuitry. Additional external power surge protection devices should be used to enhance system immunity to power surges. It is strongly recommended that overvoltage equipment such as the Clipsal 970 be installed at the switchboard.

## 5.7 Megger Testing

Megger testing must never be performed on the C-Bus data cabling or terminals, as it may degrade the performance of the network. Megger testing mains wiring of an electrical installation that has C-Bus units connected will not cause any damage to C-Bus units. Since C-Bus units contain electronic components, the installer should interpret megger readings with due regard to the nature of the circuit connection.

## 6.0 Dimensions



All dimensions are in millimeters  
No user serviceable parts inside

<b>Dimensions (mm)</b>	215 x 85 x 65mm
<b>Weight</b>	580g

## 7.0 Electrical Specifications

Catalogue No.	L5504RVF20	L5504RVF20P	LE5504TRVF20	LE5504TRV20P
Nominal Supply Voltage	220-240V a.c.		110-120V a.c.	
Frequency Range(s)	47-53Hz and 57-63Hz			
C-Bus Supply Voltage	15-36V d.c. @ 18mA required for programming when mains is not connected. Sources 200mA to the C-Bus Network with mains connected.	15-36V d.c. @ 18mA required for programming when mains power is not connected. 15-36V d.c. @ 0mA required for programming when mains power is connected. Does not source current to the C-Bus network.	15-36V d.c. @ 18mA required for programming when mains is not connected. Sources 200mA to the C-Bus network with mains connected.	15-36V d.c. @ 18mA required for programming when mains power is not connected. 15-36V d.c. @ 0mA required for programming when mains power is connected. Does not source current to the C-Bus network.
a.c. Input Impedance	50kΩ @ 1kHz A maximum of 10 units may be connected on a single C-Bus Network	100kΩ @ 1kHz A maximum of 100 units may be connected on a single C-Bus Network	50kΩ @ 1kHz A maximum of 10 units may be connected on a single C-Bus Network	100kΩ @ 1kHz A maximum of 100 units may be connected on a single C-Bus Network
Electrical Isolation	3.75kV RMS from C-Bus to mains			
Status Indicators	<b>C-Bus Indicator</b> Voltage ≥ 20V d.c. Voltage < 20V d.c. Voltage < 15V d.c. <b>Unit Status Indicator</b> On Flashing Off <b>Load Indicators (4)</b>	<b>Clock Present</b> On Flashing Off <b>Mains Power</b> Present Present Fail	<b>No Clock Present</b> Off Off Off <b>Conditions</b> Normal operations At least one channel in local or remote override mode Mains power not available	
	Load indicator is on when relay output is on.			
Maximum Number of Units on a Single C-Bus Network	10	100	10	100
Load Rating	Resistive 20A Inductive 20A Fluorescent 20A		20A 20A 20A	
Contact Type	Voltage free, magnetically latched – normally open			
Switch Operations	Greater than 60,000 operations			
Quiescent Power	4 Watts			
Warm-up Time	5 seconds			
Restart Delay	0 seconds to 42 minutes and 30 seconds			
Network Clock	Software selectable			
Network Burden	Software selectable			
Remote Override	Remote switch input can be daisy chained to a maximum of 10 units and a maximum of 1000m of cable.	Remote switch input can be daisy chained to a maximum of 100 units and a maximum of 1000m of cable.	Remote switch input can be daisy chained to a maximum of 10 units and a maximum of 1000m of cable.	Remote switch input can be daisy chained to a maximum of 100 units and a maximum of 1000m of cable.
Mains Terminals	Accommodates 2 x 1.5mm <sup>2</sup> or 1 x 2.5mm <sup>2</sup>			
C-Bus Connections	2 x RJ45 sockets			
Operating Temperature Range	0-45°C			
Operating Humidity Range	10 – 95% RH			

## 8.0 Standards Complied

### Declarations of Conformity

#### Australian/New Zealand EMC & Electrical Safety Frameworks and Standards



Regulation	Standard	Title
EMC	AS/NZS CISPR 14-1	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission
	AS/NZS CISPR 15	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
Electrical Safety	IEC 60669-2-1	Switches for household and similar fixed electrical installations – Part 2: Particular requirements – section 1: Electronic switches
	AS/NZS 3100, 3133 (Relays only)	Air-break switches for household and similar installations

#### European Council Directives and Standards



Directive	Standard	Title
EMC Directive 2004/108/EC	EN 60669-2-1 Clause 26.1	Immunity to ESD, RFI, EFT, Surge Voltages, Voltage Dips and Interruptions
	EN 60669-2-1 Clause 26.2	RF and Low Frequency Emissions
Low Voltage Directive 2006/95/EC	EN 60669-2-1	Switches for household and similar fixed electrical installations – Part 2: Particular requirements – section 1: Electronic switches
RoHS Directive 2002/95/EC		Restriction of Hazardous Substances

#### Additional Standards

Regulation	Standard	Title
Electrical Safety	IEC 60669-2-1	Switches for household and similar fixed electrical installations – Part 2: Particular requirements – section 1: Electronic switches

## 9.0 Two Year Warranty

The L5504RVF20 Series of products carry a two (2) year warranty against manufacturing defects.

### Warranty Statement

The benefits conferred herein are in addition to, and in no way shall be deemed to derogate; either expressly or by implication, any or all other rights and remedies in respect to the Clipsal Australia Pty Ltd product, which the consumer has in the location where the product is sold.

The warrantor is Clipsal Australia Pty Ltd, with offices worldwide.

This Clipsal Australia Pty Ltd product is guaranteed against faulty workmanship and materials for a period of two (2) years from the date of installation.

Clipsal Australia Pty Ltd reserves the right, at its discretion, to either repair free of parts and labour charges, replace or offer refund in respect to any article found to be faulty due to materials, parts or workmanship.

This warranty is expressly subject to the Clipsal Australia Pty Ltd product being installed, wired, tested, operated and used in accordance with the manufacturer's instructions. Any alterations or modifications made to the product without permission of Clipsal Australia Pty Ltd might void the warranty.

Clipsal Australia Pty Ltd shall meet all costs of a claim. However, should the product that is the subject of the claim be found to be in good working order, all such costs shall be met by the claimant.

When making a claim, the consumer shall forward the Clipsal Australia Pty Ltd product to the nearest Schneider Electric or Clipsal office and provide adequate particulars of the defect, within 28 days of the fault occurring. The product should be returned securely packed, complete with details of the date and place of purchase, description of load, and circumstances of malfunction.

## 10.0 Safety and Product Handling

### WARNING Electric Shock Hazard

Electric shock can cause death or serious injury. Turn off and lock out the circuit breaker serving the unit before installing or servicing the unit. Do not open the plastic case. There are no user serviceable parts inside the case.

- A qualified electrician must install the analogue output unit.
- Disconnect mains power before installing or changing wiring at the output channels.
- Using software not provided by Clipsal could result in erratic operation and could void the hardware warranty.
- The unit is for indoor use only.
- Do not attempt to make any adjustments or modifications to the unit without the assistance of Clipsal or Schneider Electric technical support.

## 11.0 Further Information

For further information about configuring this product and other C-Bus devices, please consult the documentation supplied. Further assistance can be obtained as follows:

### C-Bus Toolkit Software

Toolkit software may be used to unlock the power and flexibility of Clipsal C-Bus. Unit operation may be completely customised to suit user requirements. Advanced control functions may be programmed. For configuration guides and tutorials refer to toolkit help.

### C-Bus Installer Training Courses

Contact your nearest Clipsal Australia Sales or Technical Support Officer and enquire about Clipsal C-Bus Installer Training and Certification Programs today.

### Technical Support and Troubleshooting

For further assistance, please consult your nearest Clipsal Integrated Systems Sales Representative or Technical Support Officer.

Technical Support Contact Numbers	
<b>Australia</b>	1300 722 247 (CIS Technical Support Hotline)
<b>New Zealand</b>	0800 888 219 (CIS Technical Support Hotline)
<b>Northern Asia</b>	852 2484 4157 (Clipsal Hong Kong)
<b>South Africa</b>	(011) 314 5200 (C-Bus Technical Support)
<b>Southern Asia</b>	603 7665 3555 Ext. 236 or 242 (CIS Malaysia)
<b>United Kingdom</b>	0870 608 8 608 (Schneider Electric Support)

Technical Support email: [cis.support@clipsal.com.au](mailto:cis.support@clipsal.com.au)

Sales Support Email: [sales.cis@clipsal.com.au](mailto:sales.cis@clipsal.com.au)

Worldwide contacts are provided at <http://www.clipsal.com/locations/>

Information and resources are provided at <http://www.clipsal.com/cis/>

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